

US010467932B1

(12) **United States Patent**  
**Kooima et al.**

(10) **Patent No.:** **US 10,467,932 B1**  
(45) **Date of Patent:** **Nov. 5, 2019**

(54) **MOBILE ELEVATING APPARATUS**

(71) Applicants: **Phil Kooima**, Rock Valley, IA (US);  
**Gregory De Jager**, Rock Rapids, IA (US); **Nicholas Vande Waerdt**, Rock Valley, IA (US); **Ryan Maxwell**, Rock Valley, IA (US)

(72) Inventors: **Phil Kooima**, Rock Valley, IA (US);  
**Gregory De Jager**, Rock Rapids, IA (US); **Nicholas Vande Waerdt**, Rock Valley, IA (US); **Ryan Maxwell**, Rock Valley, IA (US)

(73) Assignee: **Kooima Company**, Rock Valley, IA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/480,477**

(22) Filed: **Apr. 6, 2017**

(51) **Int. Cl.**

**G09F 21/04** (2006.01)  
**B66F 11/04** (2006.01)  
**G09F 7/22** (2006.01)  
**G09F 7/20** (2006.01)  
**G09F 13/22** (2006.01)  
**G09F 13/00** (2006.01)  
**G09F 7/18** (2006.01)

(52) **U.S. Cl.**

CPC ..... **G09F 21/04** (2013.01); **B66F 11/042** (2013.01); **G09F 7/20** (2013.01); **G09F 7/22** (2013.01); **G09F 13/005** (2013.01); **G09F 13/22** (2013.01); **G09F 2007/1865** (2013.01); **G09F 2013/222** (2013.01)

(58) **Field of Classification Search**

CPC ..... **G09F 21/04**; **G09F 21/043**; **G09F 17/00**;  
**G09F 15/0025**; **B60R 13/00**; **B60Q 1/50**;  
**B60Q 7/005**; **E01F 9/0126**  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

862,904	A *	8/1907	Harrison	.....	G09F 19/08
					40/411
D243,235	S *	2/1977	Buxbom	.....	D12/96
4,110,792	A *	8/1978	Long	.....	G09F 13/28
					345/55
4,484,663	A	11/1984	Wyse		
4,488,326	A	12/1984	Cherry		
4,495,719	A *	1/1985	Futatsuishi	.....	G09F 21/04
					40/590
4,890,692	A *	1/1990	Oakman	.....	B66F 3/22
					182/141

(Continued)

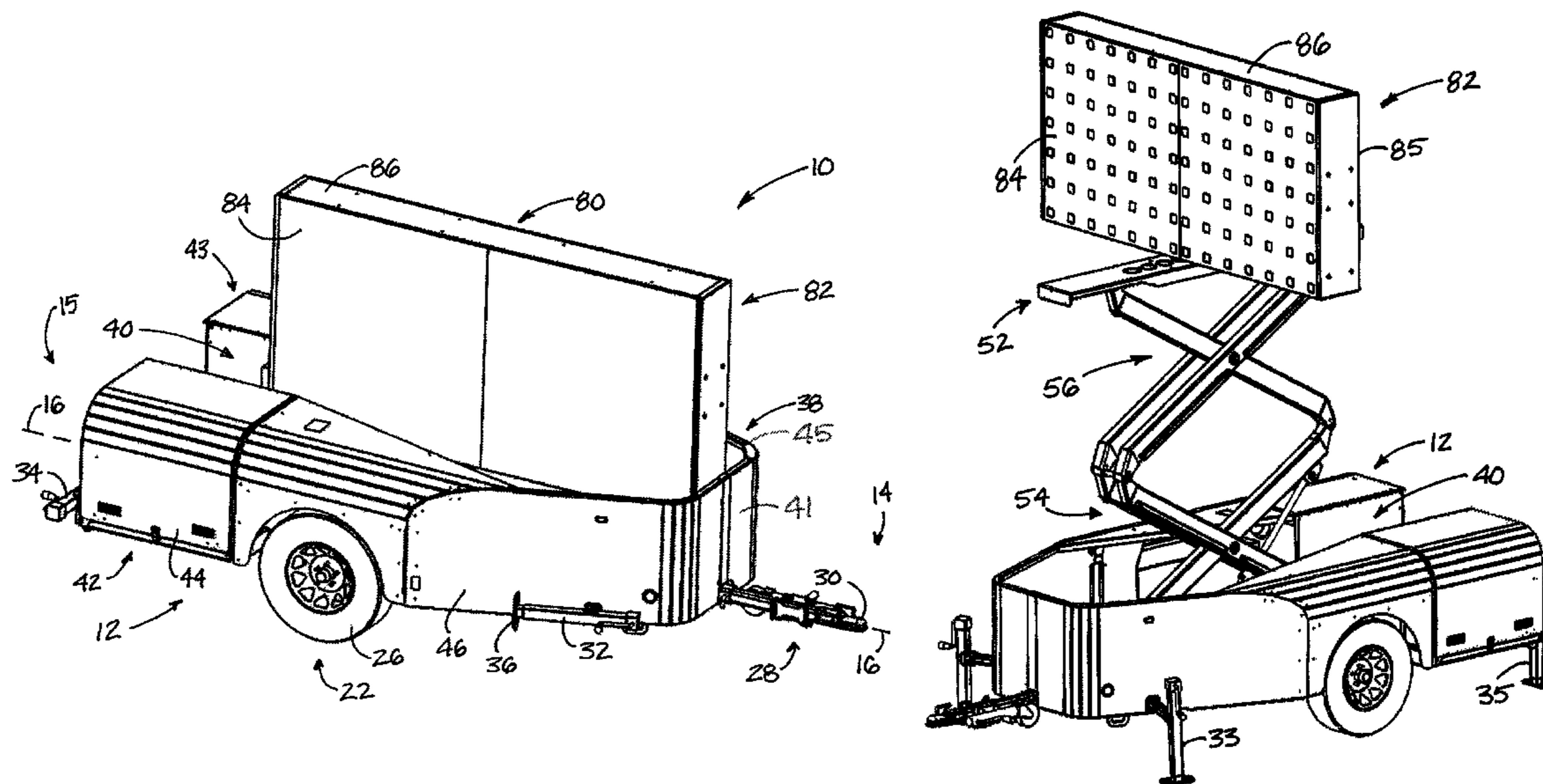
*Primary Examiner* — Cassandra Davis

(74) *Attorney, Agent, or Firm* — Jeffrey A. Proehl;  
Woods, Fuller, Shultz & Smith, PC

(57) **ABSTRACT**

A mobile elevating apparatus may include a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, with the mobile base comprising a frame and a wheel assembly mounted on the frame to support the frame in a manner permitting mobility. The apparatus may also include a lift assembly including at least one tier and being mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly, an object mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the object, a power source positioned on the mobile base; and a control assembly mounted on the mobile base. In embodiments, the object may comprise a display sign.

**22 Claims, 12 Drawing Sheets**



(56)

References Cited

U.S. PATENT DOCUMENTS

4,930,598	A *	6/1990	Murrill	.....	B66F 11/042	7,281,736	B2	10/2007	Sannah	
					182/141	7,493,987	B2	2/2009	Puszkiewicz	
5,099,748	A	3/1992	Neubauer			7,543,671	B2	6/2009	Donaldson	
5,121,816	A	6/1992	Curtin			7,549,667	B2	6/2009	Busuttil	
5,669,517	A	9/1997	Donaldson			7,559,536	B1 *	7/2009	Hansen	..... E04F 11/1851
5,683,063	A	11/1997	Seiders							256/25
5,694,864	A	12/1997	Langewellpott			7,600,959	B2	10/2009	Neubauer	
5,740,887	A	4/1998	Unger			7,726,690	B1 *	6/2010	James	..... B60J 7/165
5,755,306	A	5/1998	Kraemer							182/69.5
5,890,559	A	4/1999	Busuttil			8,056,674	B2	11/2011	Bean	
5,890,737	A	4/1999	Hutka			8,595,965	B2 *	12/2013	Sipperley	..... B61D 3/16
5,938,184	A *	8/1999	DeSouza	.....	E04H 17/1421					40/588
					256/19	8,631,902	B2	1/2014	Crook	
6,065,565	A	5/2000	Puszkiewicz			8,678,135	B2	3/2014	Crook	
6,095,286	A	8/2000	Citron			9,108,831	B2	8/2015	Beji	
6,173,810	B1	1/2001	Citron			9,174,488	B2	11/2015	Berry	
6,276,489	B1	8/2001	Busuttil			9,238,573	B2	1/2016	Luminet	
6,286,812	B1	9/2001	Cherry			9,311,833	B2 *	4/2016	George, II	..... G09F 21/04
6,371,243	B1	4/2002	Donaldson			9,620,040	B2 *	4/2017	Kaytes	..... B65F 1/122
6,405,114	B1	6/2002	Priestley			2003/0000769	A1 *	1/2003	Pyle	..... E06C 1/39
6,425,459	B1	7/2002	Keefer							182/63.1
6,517,225	B1	2/2003	Allen			2007/0125581	A1	6/2007	Busuttil	
6,561,546	B2	5/2003	Puszkiewicz			2008/0105498	A1 *	5/2008	Perkins	..... B66F 11/042
6,571,913	B2	6/2003	Puszkiewicz							187/269
6,607,285	B2	8/2003	Citron			2010/0294592	A1	11/2010	Crook	
6,761,641	B2 *	7/2004	Martin	.....	A63B 71/022	2011/0067279	A1 *	3/2011	Dos Santos Camacho	.....
					256/24					G09F 7/22
6,874,263	B2 *	4/2005	Ohmuku	.....	G09F 15/0025					40/601
					40/212	2011/0168490	A1	7/2011	Donaldson	
RE39,477	E	1/2007	Plate			2012/0043159	A1	2/2012	Clark	
						2012/0211301	A1	8/2012	Clark	

\* cited by examiner

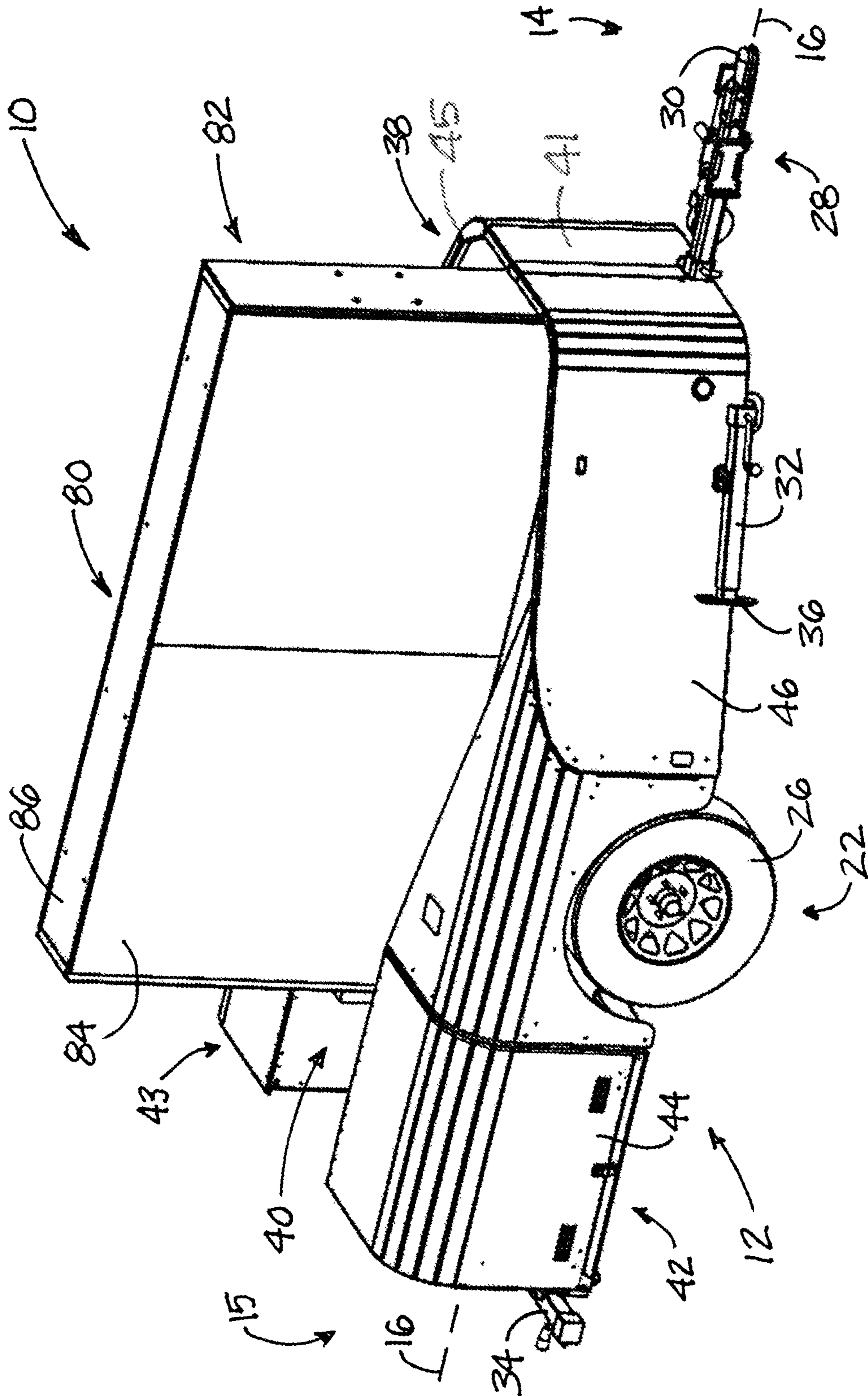


FIG. 1

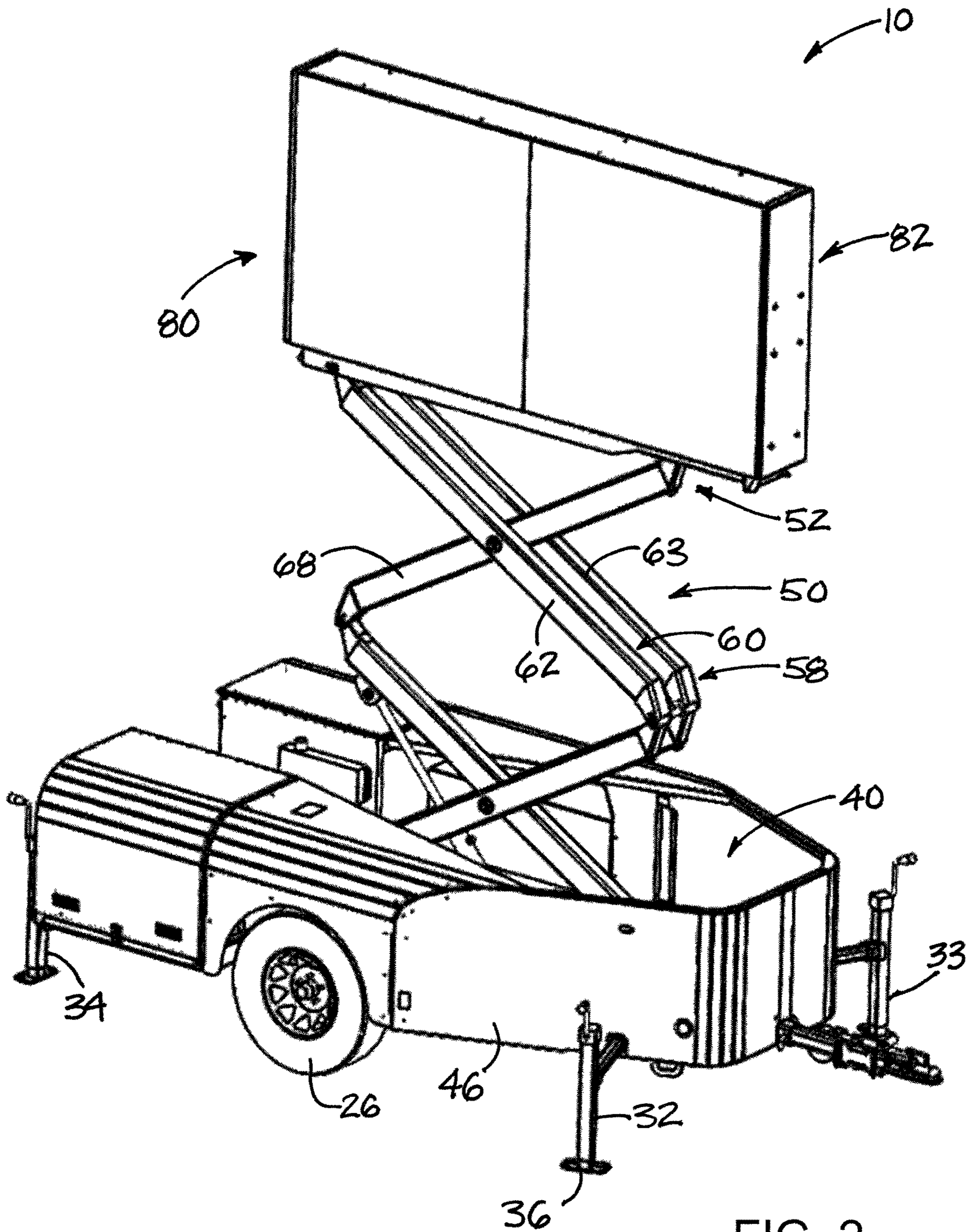


FIG. 2

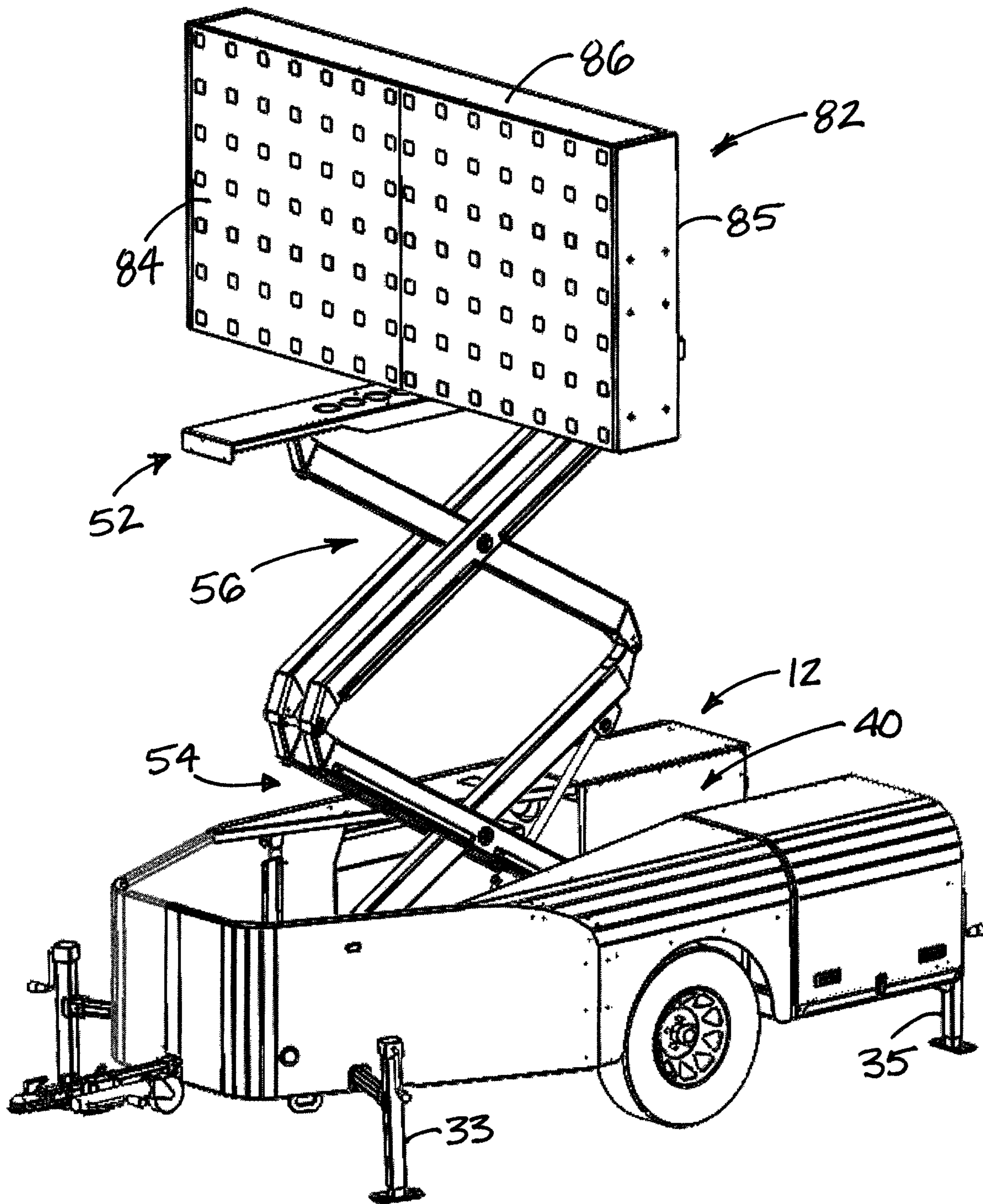


FIG. 3

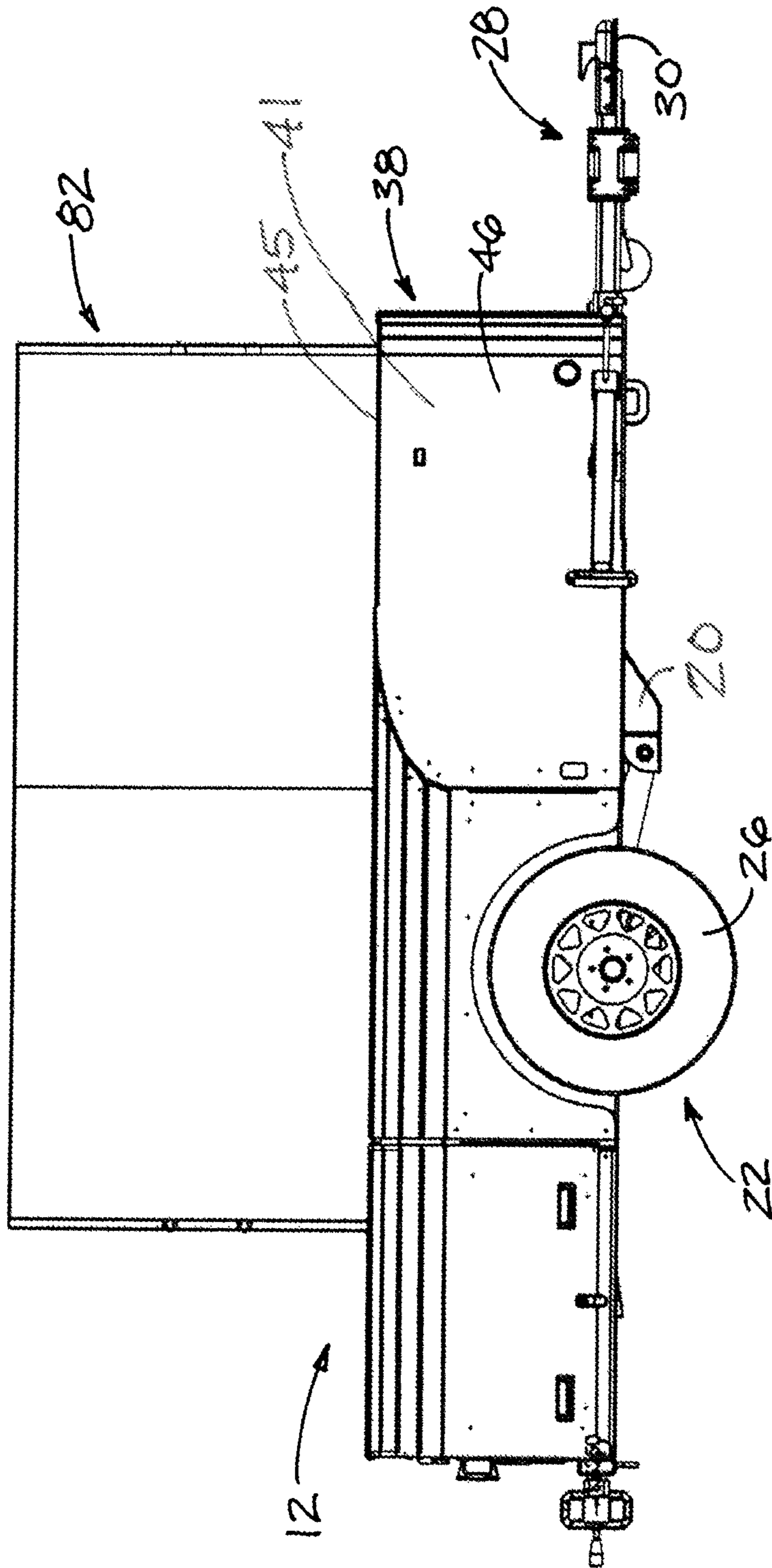


FIG. 4

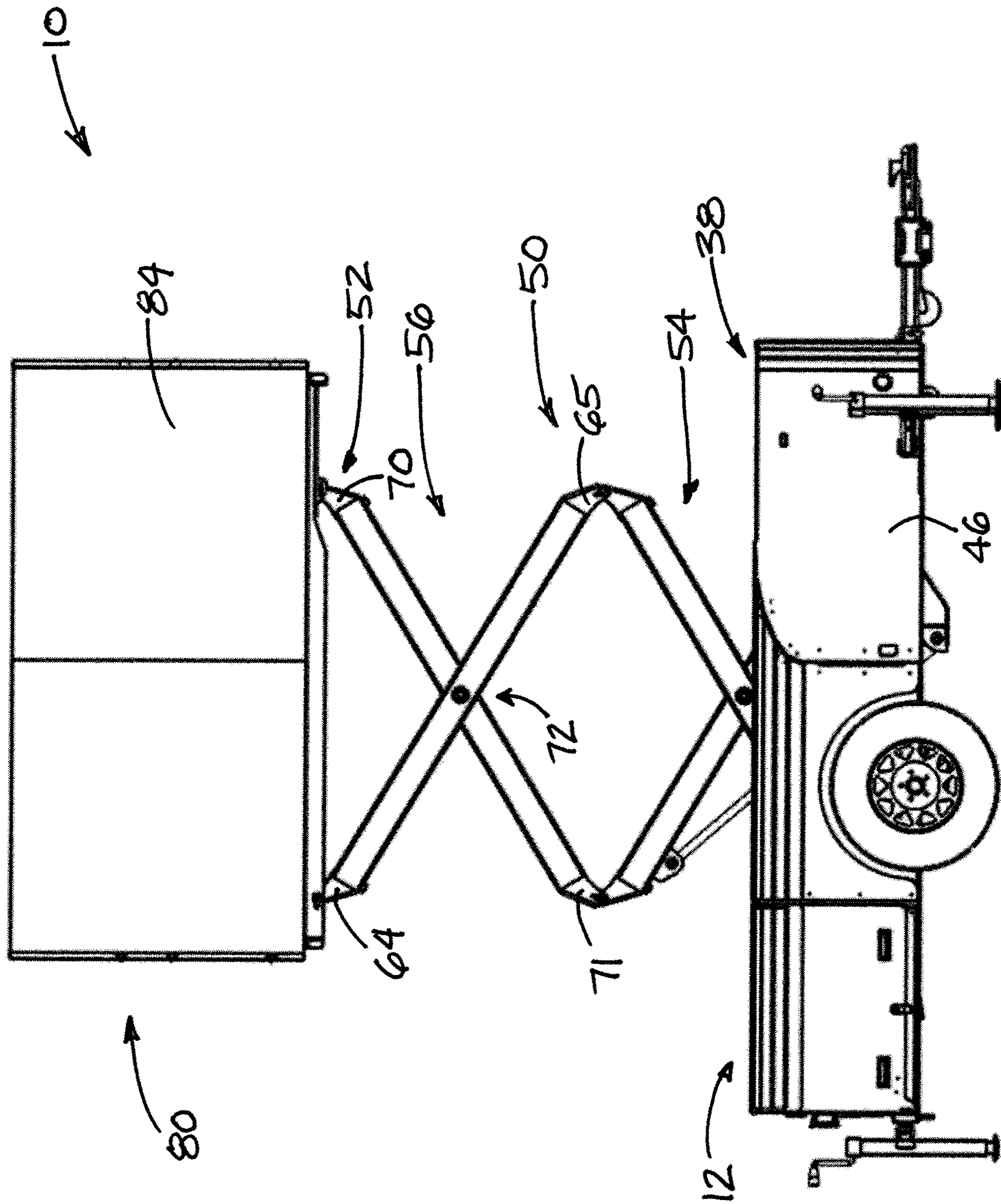


FIG. 5

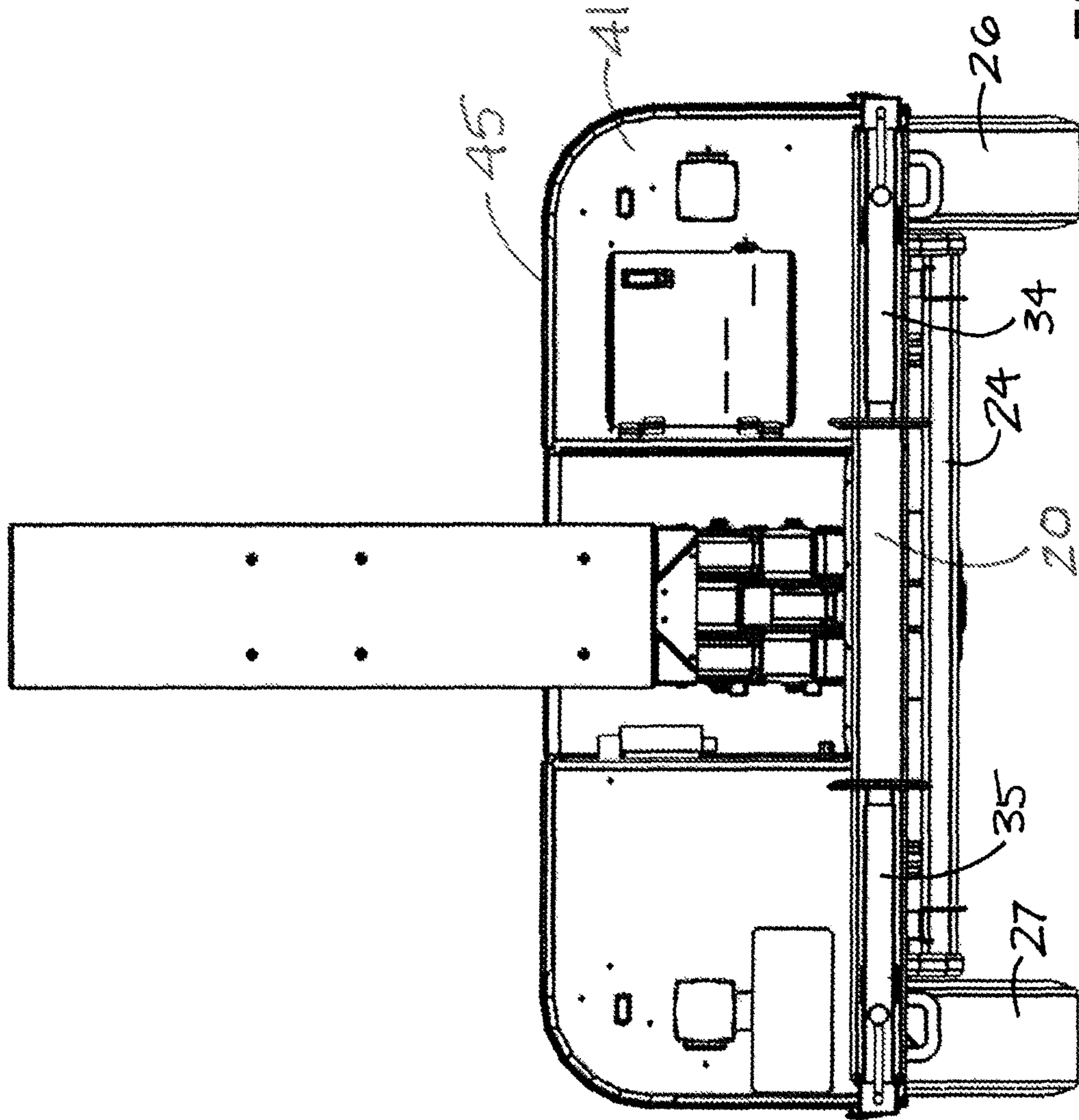


FIG. 6



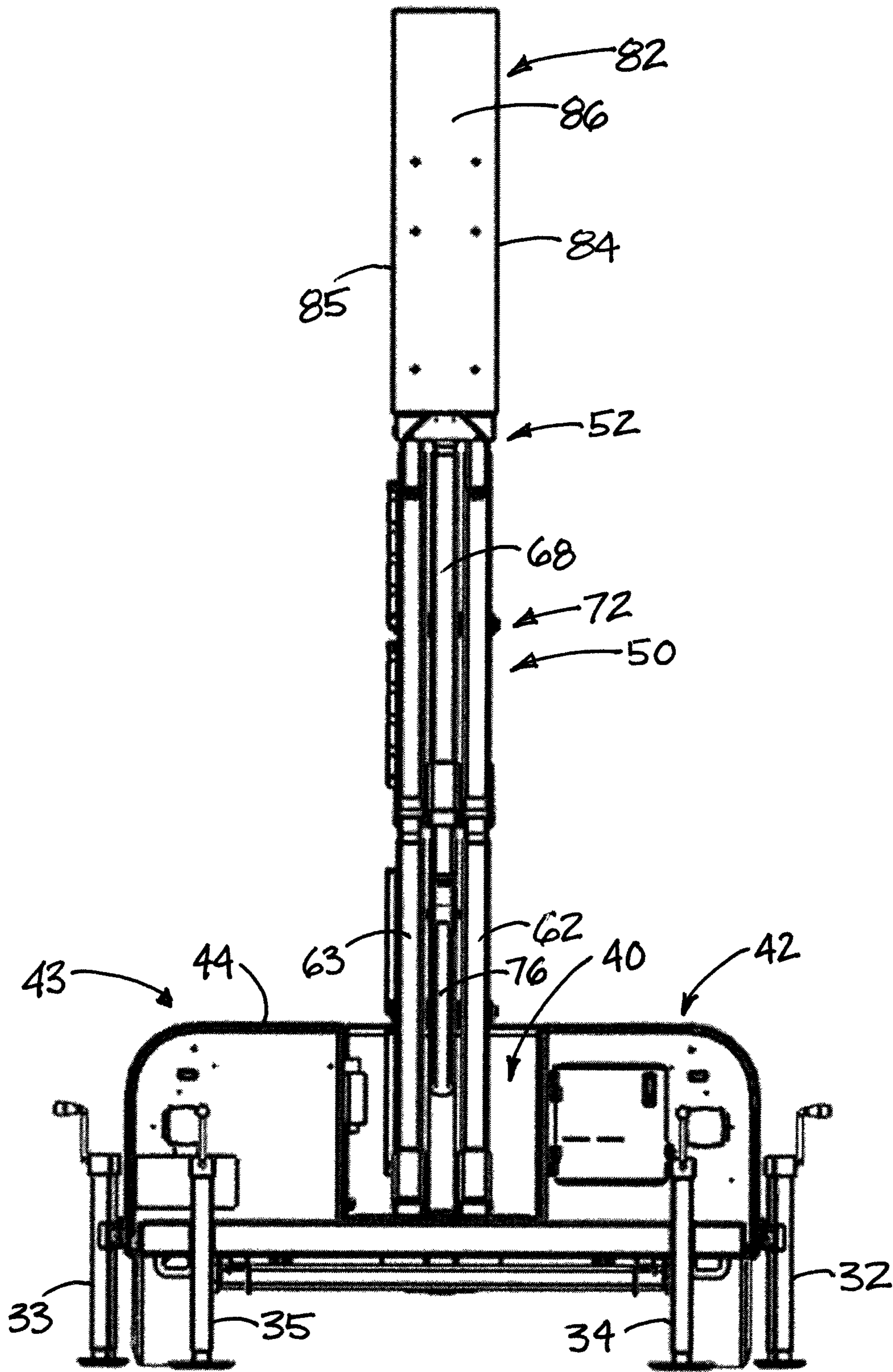


FIG. 7

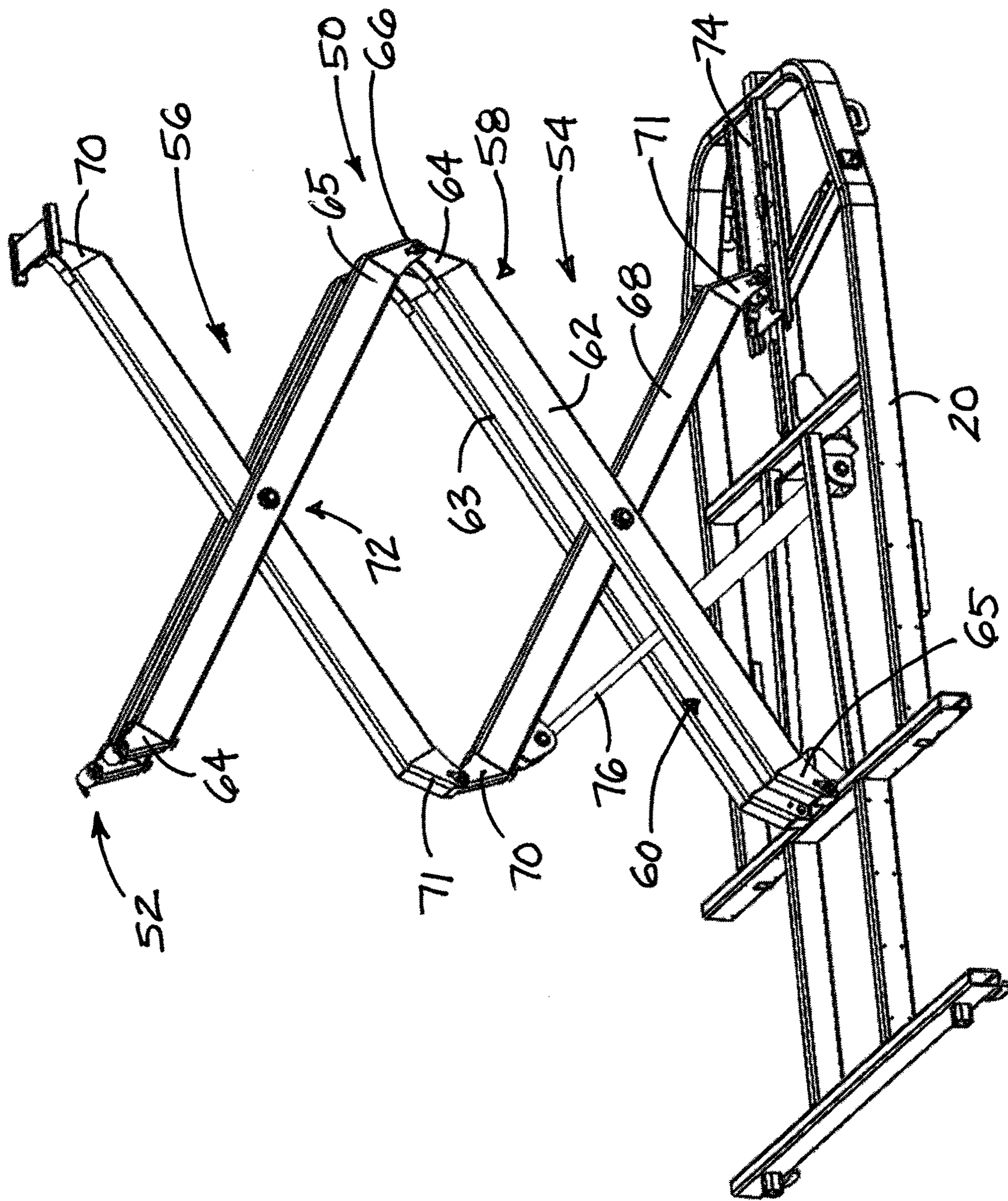


FIG. 8

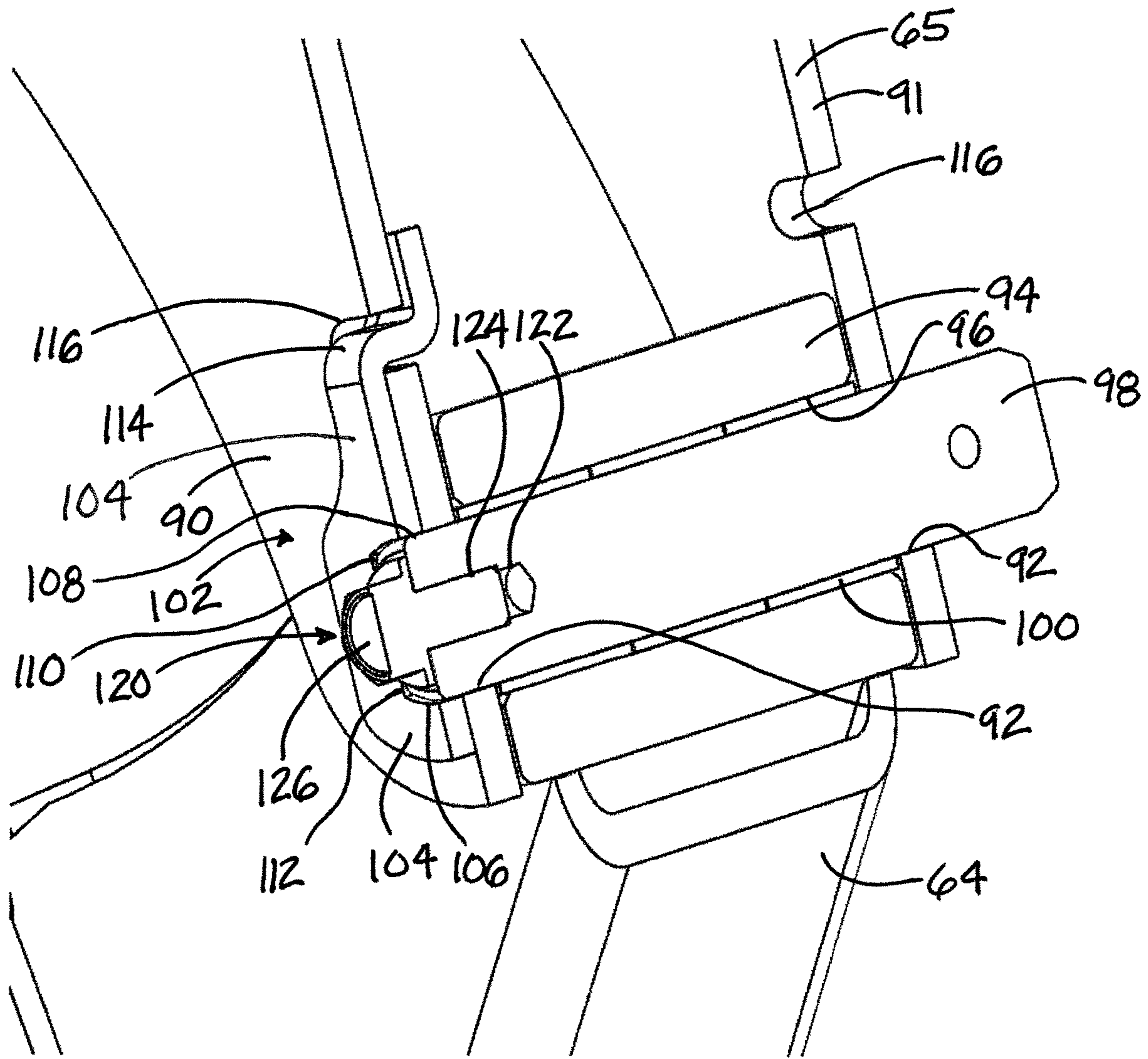


FIG. 9

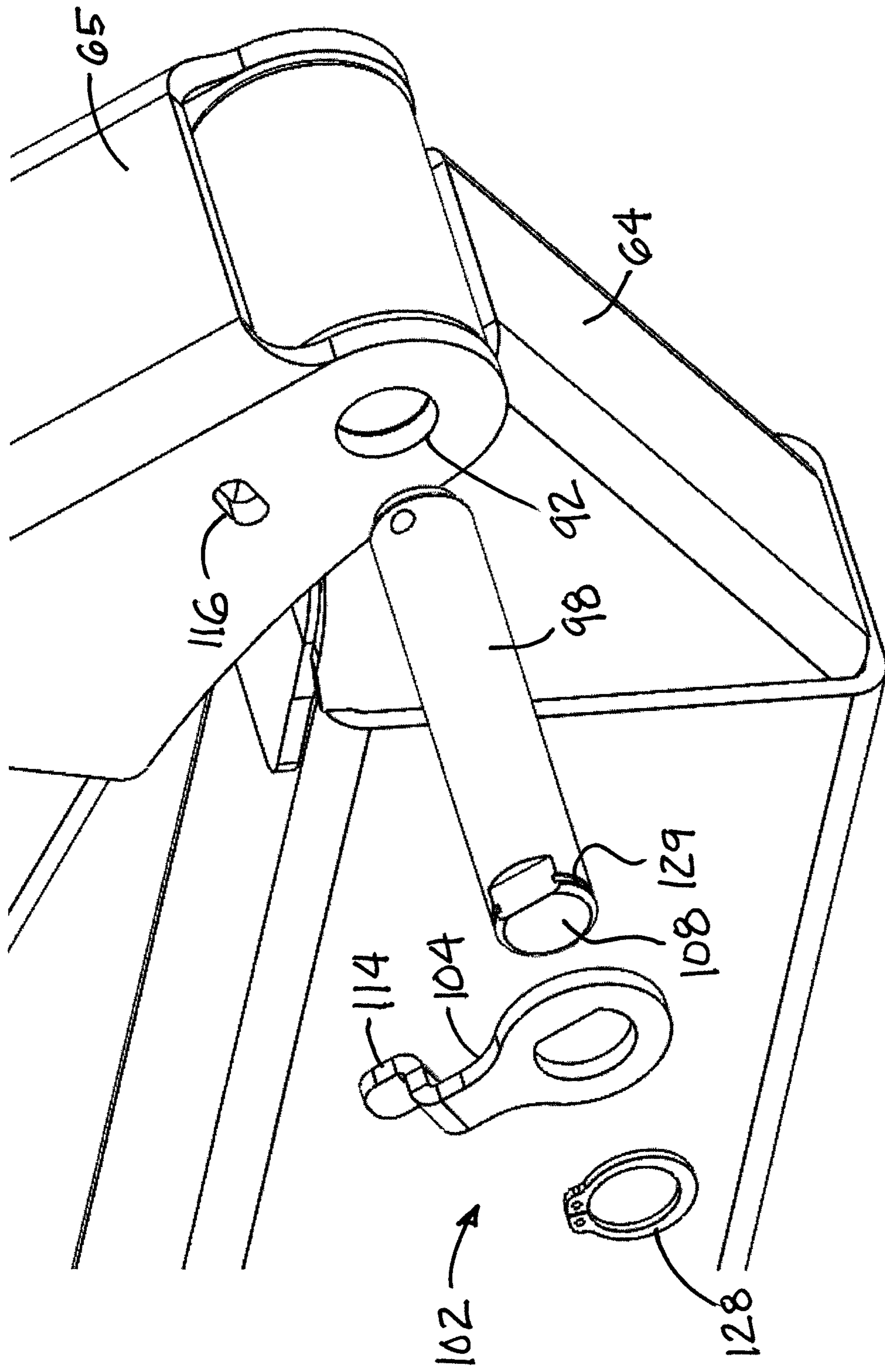


FIG. 10

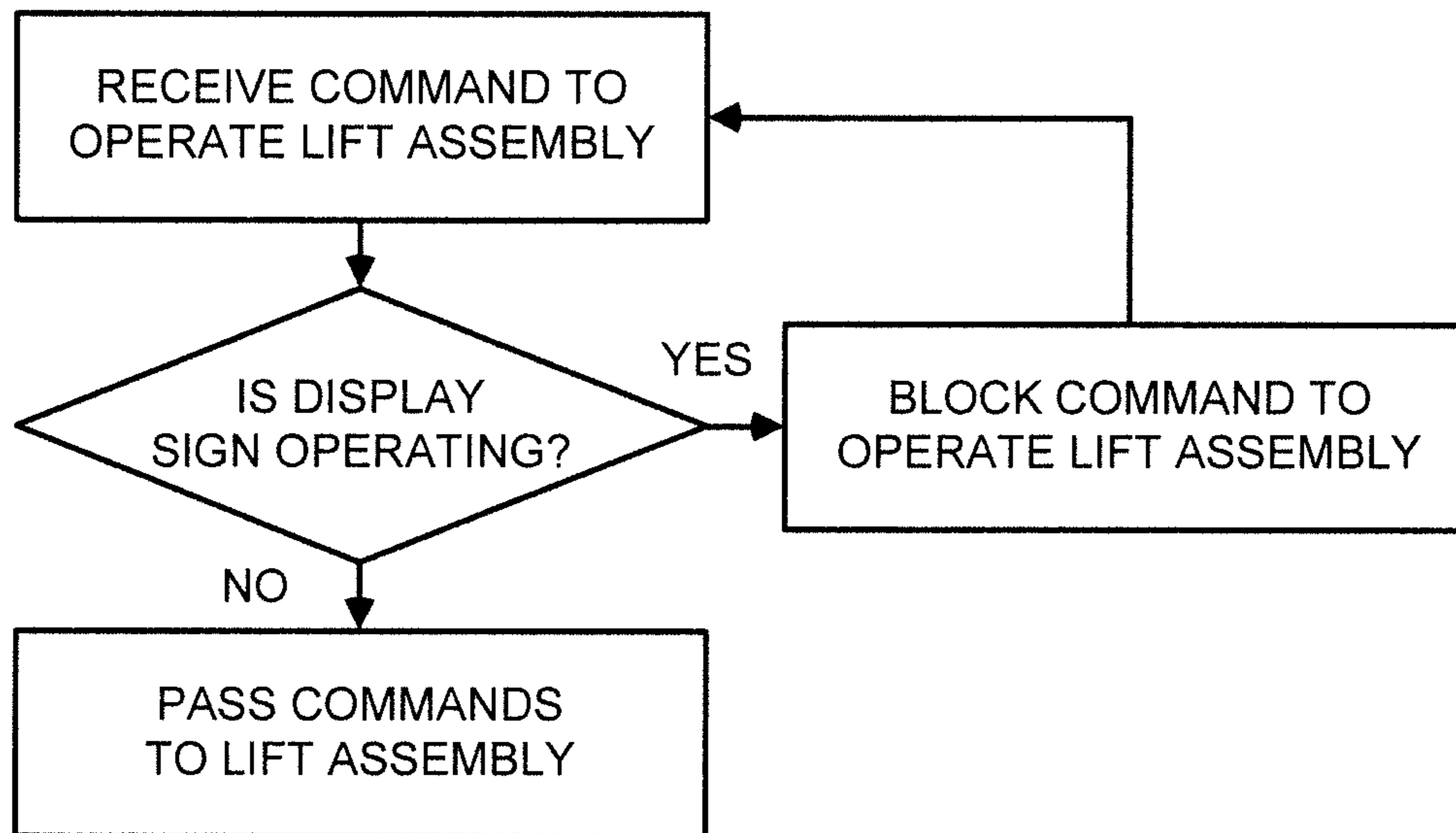


FIG. 11

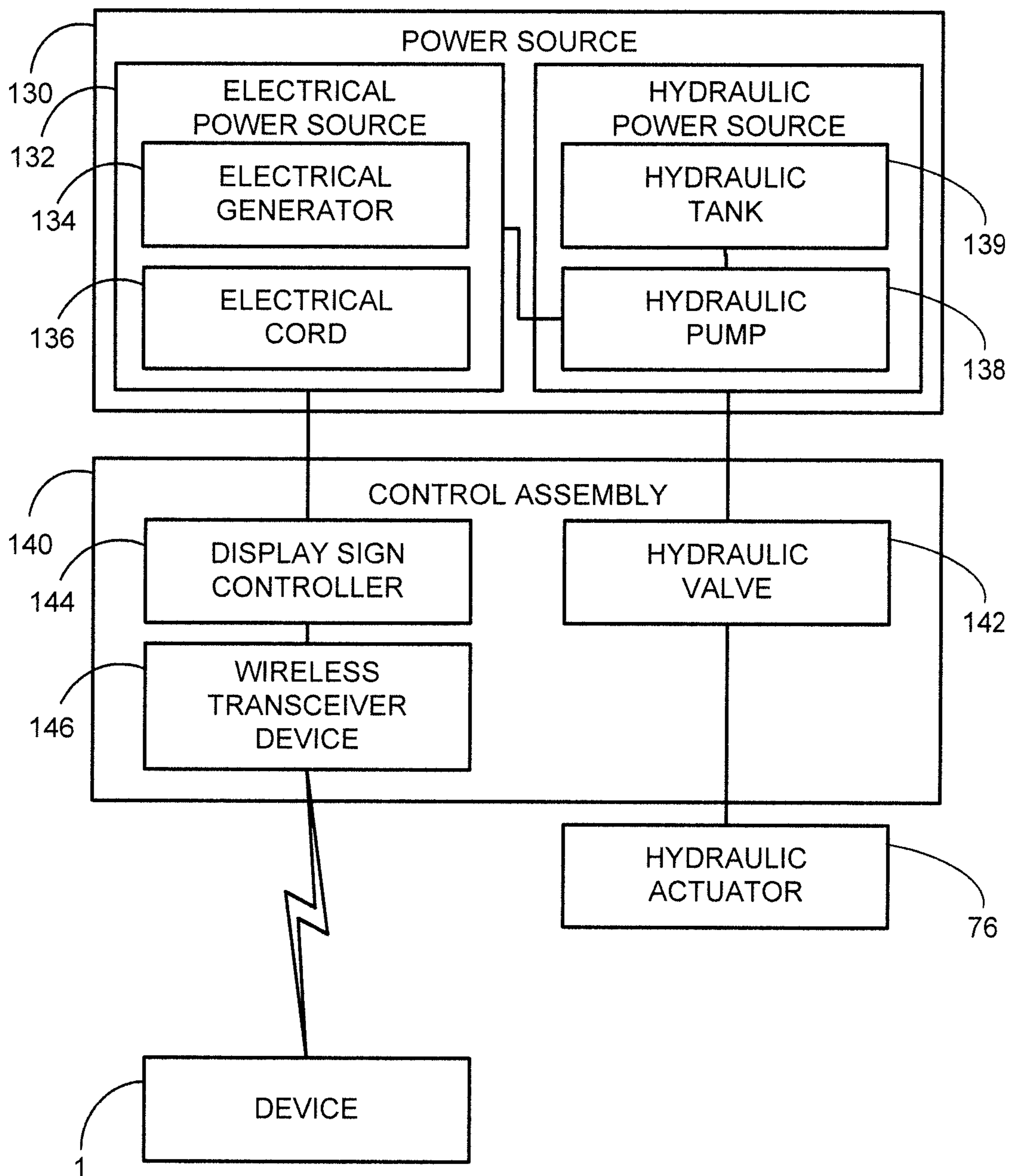


FIG. 12

**MOBILE ELEVATING APPARATUS**

## BACKGROUND

## Field

The present disclosure relates to display sign systems and more particularly pertains to a new mobile elevating apparatus for providing, for example, a portable signage capability.

## SUMMARY

in one aspect, the present disclosure relates to a mobile elevating apparatus comprising a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, with the mobile base comprising a frame and a wheel assembly mounted on the frame to support the frame in a manner permitting mobility. The apparatus may also comprise a lift assembly mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly, with the lift assembly including at least one tier. The apparatus may further comprise an object mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the object, a power source positioned on the mobile base, and a control assembly mounted on the mobile base.

In some embodiments, the object may comprise a display sign, with the display sign having opposite display faces with at least one of the display faces including an illuminated changeable display.

There has thus been outlined, rather broadly, some of the more important elements of the disclosure in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional elements of the disclosure that will be described hereinafter and which will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment or implementation in greater detail, it is to be understood that the scope of the disclosure is not limited in its application to the details of construction and to the arrangements of the components, and the particulars of the steps of operation, set forth in the following description or illustrated in the drawings. The disclosure is capable of other embodiments and implementations and is thus capable of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present disclosure. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present disclosure.

The advantages of the various embodiments of the present disclosure, along with the various features of novelty that characterize the disclosure, are disclosed in the following descriptive matter and accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be better understood and when consideration is given to the drawings and the detailed description which follows. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a schematic perspective side view of a new mobile elevating apparatus according to the present disclosure, showing the lift assembly in the retracted position.

FIG. 2 is a schematic perspective side view of the mobile elevating apparatus with the lift assembly in the extended position, according to an illustrative embodiment.

FIG. 3 is a schematic perspective side view of the mobile elevating apparatus with the lift assembly in the extended position and the display sign rotated, according to an illustrative embodiment.

FIG. 4 is a schematic side view of the mobile elevating apparatus showing the lift assembly in the retracted position, according to an illustrative embodiment.

FIG. 5 is a schematic side view of the mobile elevating apparatus showing the lift assembly in the extended position, according to an illustrative embodiment.

FIG. 6 is a schematic rear view of the mobile elevating apparatus showing the lift assembly in the retracted position, according to an illustrative embodiment.

FIG. 7 is a schematic rear view of the mobile elevating apparatus showing the lift assembly in the extended position, according to an illustrative embodiment.

FIG. 8 is a schematic perspective view of the frame and lift assembly in the extended position, according to an illustrative embodiment.

FIG. 9 is a schematic perspective view of one configuration of the joint of the lift assembly with portions broken away to reveal detail, according to an illustrative embodiment.

FIG. 10 is a schematic exploded perspective view of another configuration of the joint of the lift assembly with portions broken away to reveal detail, according to an illustrative embodiment.

FIG. 11 is a schematic flow diagram of some optional aspects of the operation of the apparatus, according to an illustrative embodiment.

FIG. 12 is a schematic diagram of various power and control elements of the apparatus, according to an illustrative embodiment.

## DETAILED DESCRIPTION

With reference now to the drawings, and in particular to FIGS. 1 through 12 thereof, a new mobile elevating apparatus embodying the principles and concepts of the disclosed subject matter will be described.

In one aspect, the disclosure relates to a mobile elevating apparatus 10 suitable for transporting and elevating various objects for which a raised position may be desirable, such as, for example, a sign or platform but not limited to these illustrative applications.

The apparatus 10 may include a mobile base 12 which has a front 14 and a rear 15, with a longitudinal axis 16 that is defined between the front and rear and that defines a longitudinal direction for the mobile base. The mobile base 12 may include a frame 20 for supporting may of the elements of the apparatus in a condition raised above the ground surface which permits movement of the apparatus over the ground surface and preferably along roads and highways. A wheel assembly 22 may be mounted on the frame to at least partially support the frame above the ground surface and to permit the frame to travel over the ground surface. The wheel assembly 22 may include an axle 24 mounted on the frame, optionally via a suspension structure, and a pair of wheels 26, 27 may be mounted on the ends of the axle.

The mobile base **12** may also include a tongue assembly **28** which is mounted on the frame **20**. The tongue assembly may include a hitch **30** for hitching to a towing vehicle to tow the mobile base over a ground or road surface. The tongue assembly **28** may extend forwardly from the frame **20** and may extend to the front **14** of the mobile base where the hitch **30** may be located. A portion of the tongue assembly **28** may be removably mounted on the frame **20** to permit removal of the portion from the frame when towing of the mobile base **12** is not required in order to enhance, for example, the security of the apparatus by making it difficult if not impossible to tow away the apparatus without the removable portion of the tongue assembly, and to also beneficially provide a smaller footprint for the apparatus when positioned in place for use. Optionally, a portion of the tongue assembly may be pivotally mounted on the frame to permit the portion to be pivoted to the side in a substantially horizontal plane.

The mobile base **12** may also include a set of outrigger legs **32, 33, 34, 35** which are mounted on the frame for providing greater stability of the apparatus when the mobile base is stationary for use. Each of the outrigger legs may have a lower pad **36** for contacting the ground surface. The lower pad **36** may be extendable downwardly and retractable upwardly with respect to the mobile base. The set of outrigger legs may include a pair of front outrigger legs **32, 33** which are positioned toward the front **14** of the mobile base and a pair of rear outrigger legs **34, 35** which are positioned toward the rear **15** of the mobile base. The pair of front outrigger legs may have portions which are laterally extendable with respect to the frame to adjust a position of the lower pad **30** of each of the front outrigger legs in a lateral horizontal direction to thereby broaden the base of contact with the ground with respect to the frame **20** while minimizing the travel width of the mobile base.

The mobile base **12** may also include a body **38** which is mounted on the frame **20** and may define a bay **40** into which at least a portion of an object **80** may be received (see, for example, FIGS. **1, 4** and **6**). The body **38** may cover a portion of the frame **20** and form a perimeter wall **41** which extends upwardly from the frame and extends continuously from the frame to an upper edge **45** of the perimeter wall (see, for example, FIGS. **1, 4,** and **6**). The body **38** may further define at least one compartment **42**, and in some embodiments may define a pair of compartments **42, 43**, with each of the compartments being positioned laterally of the bay **40**. Each of the compartments may have a cover **44** and the cover may be pivotally mounted on the remainder of the body to permit pivot opening and closing of the cover to access the interior of the compartment. The perimeter wall **41** of the body **38** may also include a forward fairing portion **46** which may taper narrower in width toward the front **14** of the mobile base and taper wider toward the rear **15** of the mobile base.

The apparatus **10** may also include a lift assembly **50** which is mounted on the frame **20** and is extendable and retractable generally in a vertical direction with respect to the frame to raise and lower a top **52** of the lift assembly. The lift assembly **50** may include at least one tier **54**, and in some embodiments includes a plurality of tiers **54, 56**. The plurality of tiers may include a lowermost tier **54** and a second tier **55** which is located above the lowermost tier.

Each tier of the lift assembly **50** may include a bifurcated beam **58** which may define a gap **60** between a pair of beam portions **62, 63** which form the bifurcated beam. The beam portion **62, 63** may be spaced from each other and may be oriented substantially parallel to each other. Each bifurcated

beam **58** may have an upper end **64** and a lower end **65**. A joint **66** may join together in a pivotal manner the upper end of one of the beam portions of a relatively lower tier to the lower end of a beam portion in a relatively higher tier. Each tier of the lift assembly may also include a single beam **68** having an upper end **70** and a lower end **71**. The single beam **68** may extend through the gap **60** of the bifurcated beam and the single beam may be pivotally mounted on the bifurcated beam at a pivot **72** which is generally located medially between the upper **70** and lower **71** ends of the single beam and is also located medially between the upper **64** and lower **65** ends of the bifurcated beam.

The lower end **71** of the single beam in the lowermost tier **54** of the lift assembly **50** may be mounted on the frame **20** in a manner permitting translation of the lower end of the single beam with respect to the frame. In some embodiments, the lower end **71** of the single beam may be mounted on a track **74** to permit translation movement of the end **71** with respect to the frame along the track. The track **74** may extend in a longitudinal direction of the mobile base.

The lift assembly **50** may also include a lift actuator **76** which is configured to extend and retract the tier or tiers of the lift assembly with respect to the frame. The lift actuator **76** may be configured to pivot the bifurcated beams and single beams with respect to each other, and may act upon the lowermost tier. In some embodiments, the lift actuator may be extendable and retractable and may have a lower end mounted on the frame **20** and an upper end mounted on, for example, the single beam **68**. The lift actuator may be at least partially located in the gap defined by the bifurcated beam to minimize the footprint of the lift assembly. Illustratively, the lift actuator **76** may comprise a hydraulic piston and cylinder actuator which utilizes a hydraulic pressure on at least one side of the piston to produce extension and retraction. In some embodiments, the actuator may be double-acting, while in other embodiments the actuator may be single-acting and rely upon the weight of the lift assembly to cause retraction of the actuator.

An object **80** may be mounted on the top of the lift assembly **50** such that extension and retraction of the lift assembly raises and lowers the object. In some embodiments, the object **80** may comprise a display sign **82**. The display sign may be elongated in the longitudinal direction **16** of the mobile base and may have opposite display faces **84, 85** which may face laterally with respect to the mobile base. In some embodiments, the sign **82** may be rotatable about a substantially vertical axis with respect to the lift assembly **50** and the frame **20** such that the display faces **84, 85** face forward forwardly and rearwardly rather than laterally. The rotation of the sign may be performed manually or through powered means. The display sign **82** may have a perimeter edge **86** which extends between the display faces **84, 85**. At least one, and optionally both, of the display faces may include an illuminated changeable display capable of displaying characters, graphics, etc., and may include, for example, light-emitting diode elements to produce the display although other display technologies may be employed for the display sign. The changeable display elements of each display face may be independently operable so that the sign may have a mode in which both of the faces are actively displaying and another mode in which only one of the faces is actively displaying. Also, the display elements of the two display faces may display the same content or may display different content at the same time. Optionally only one of the display faces may have a changeable display while the other display does not have the changeable display.



## 5

In other embodiments of the apparatus, the object **80** may comprise a platform which may have an upper surface for supporting a person and/or cargo to vertically transport the person or cargo between a lower vertical level and a higher vertical level.

In some embodiments, the joint **66** between the ends of bifurcated beams of vertically adjacent tiers may comprise a pair of spaced walls **90, 91** of the lower end **65** of one of the beam portions **62, 63**. Each of the spaced walls **90, 91** may have an aperture **92** formed in axial alignment with a corresponding aperture formed in the other spaced wall. The joint may further include a sleeve **94** which is mounted on the upper end **64** of the beam portion of another bifurcated beam, and a bore **96** may extend through the sleeve **94**. A pin **98** may extend through the apertures **92** of the spaced walls **90, 91** as well as through the bore **96** of the sleeve **94**. A bearing **100** may be positioned between the pin **98** and the sleeve **94**.

The joint **66** may also include a retainer device **102** which is configured to retain the pin **98** in position on the spaced walls **90, 91** and the sleeve **94**. The retainer device **102** may be configured to resist rotation of the pin with respect to the spaced walls **90, 91** while permitting rotation of the pin with respect to the sleeve **94**, as well as the bearing **100** positioned between the pin and the sleeve. The retainer device **102** may include a retainer bracket **104** which may have a retainer aperture **106** formed therein. The retainer aperture **106** may receive an end portion **108** of the pin. The shape of the retainer aperture and the shape of the end portion of the pin may be complementary to interlock to resist rotation of the pin with respect to the retainer bracket when the end portion is inserted into the retainer aperture. Illustratively, the end portion of the pin may have at least one flat surface **110** and the retainer aperture **106** of the retainer bracket may have at least one flat surface **112** which is configured to engage the flat surface of the end portion of the pin. In some embodiments, a pair of the flat surfaces may be formed on the end portion of the pin and the retainer aperture may have a pair of flat surfaces in complementary positions, and usually in opposing positions. The retainer bracket **104** may have a tab portion **114** which is inserted into a hole **116** formed in one of the spaced walls **90, 91** to resist rotation of the retainer bracket with respect to the spaced wall. Optionally, a pair of the retainer brackets may be utilized for a beam portion with the bracket being located on either side of the same pin which may also help resist the spaced walls from spreading away from each other.

The retainer device **102** may also include structure for retaining the retainer bracket on the pin in a removable manner. In some embodiments, such as shown in FIG. **9**, the retaining structure includes a retainer fastener **120** which is threaded into a threaded bore **122** on the end portion **108** of the pin. A portion of the retainer fastener **120** may extend beyond the end portion of the pin to resist removal of the retainer bracket from the end portion **108** without requiring removal of the retainer fastener. The retainer fastener may have a threaded shaft portion **124** which is at least partially inserted into the threaded bore **122** on the end portion of the pin and a head portion **126** which overlaps a portion of the retainer bracket.

In some embodiments, the structure for retaining the retainer bracket on the pin, such as shown in FIG. **10**, includes a retaining clip **128** removable positionable in a groove **129** formed on the end portion **108** to block removal of the retainer from the end portion of the pin when the clip **128** is in position.

## 6

The apparatus **10** may also include a power source **130** which is positioned on the mobile base **12**. The power source **130** may include an electrical power source **132** which is configured to provide electrical power to the display sign **82**.

In some embodiments, the electrical power source **132** may comprise an electrical generator **134** mounted on the mobile base and which may be positioned in one of the compartments formed by the body **38** of the mobile base. In some embodiments, in addition to or as an alternative to the electrical generator **34**, the electrical power source may include an electrical power cord **136** with an electrical plug which is configured to be plugged into an electrical outlet to provide power from the electrical utility power grid. The power source **130** may also include a hydraulic pump **138** which is configured to pressurize a quantity of hydraulic fluid drawn from a hydraulic tank **139**. The hydraulic pump may be operated by electrical power provided by the electrical power source. The hydraulic pump **138** may be in communication with the lift actuator **76** of the lift assembly to operate the actuator.

The apparatus **10** may also include a control assembly **140** which is mounted on the mobile base **12**. The control assembly **140** may include a hydraulic valve **142** which is configured to control the flow of pressurized hydraulic fluid from the hydraulic pump **138** to the lift actuator **76**. The hydraulic valve **142** may be configured to direct hydraulic fluid to the lift actuator in a manner permitting extension or retraction of the lift actuator. The control assembly **140** may also include a display sign controller **144** mounted on the mobile base and suitable for controlling display of images on the illuminated changeable display of the display sign. The display sign controller **144** may include a wireless transceiver device **146** which is configured to transmit and receive signals from a device **1**, such as a smartphone via a software program or app enabling the transmission and reception of signals via a suitable wireless protocol, such as Wi-Fi, Bluetooth or near field communication (NFC).

In operation, some embodiments of the apparatus **10** may be configured so that the control assembly **140** may be configured to prevent operation of the lift assembly, and more specifically of the lift actuator, if the display sign is receiving electrical power to display images. The control assembly may be configured to prevent the supply of electrical power to the hydraulic pump permitting operation of the lift actuator if it is determined that electrical power is being supplied to the display sign for displaying images.

It should be appreciated that in the foregoing description and appended claims, that the terms “substantially” and “approximately,” when used to modify another term, mean “for the most part” or “being largely but not wholly or completely that which is specified” by the modified term.

It should also be appreciated from the foregoing description that, except when mutually exclusive, the features of the various embodiments described herein may be combined with features of other embodiments as desired while remaining within the intended scope of the disclosure.

Further, those skilled in the art will appreciate that steps set forth in the description and/or shown in the drawing figures may be altered in a variety of ways. For example, the order of the steps may be rearranged, substeps may be performed in parallel, shown steps may be omitted, or other steps may be included, etc.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the disclosed embodiments and implementations, to include variations in size, materials, shape, form, function

and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art in light of the foregoing disclosure, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present disclosure.

Therefore, the foregoing is considered as illustrative only of the principles of the disclosure. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the disclosed subject matter to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to that fall within the scope of the claims.

We claim:

1. A mobile elevating apparatus comprising:
  - a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, the mobile base comprising a frame;
  - a lift assembly mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly between a raised position when the lift assembly is extended and a lowered position when the lift assembly is retracted, the lift assembly including at least one tier;
  - a display sign mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the display sign between a raised condition and a lowered condition;
  - a power source positioned on the mobile base; and
  - a control assembly mounted on the mobile base; and
  - wherein the mobile base includes a body forming a perimeter wall extending at least partially around a central bay having a forward portion toward a front of the mobile base and a rearward portion toward the rear of the mobile base, the perimeter wall of the body extending substantially continuously without interruption from the frame to an upper edge of the perimeter wall;
  - wherein the lowered condition of the display sign is characterized by a lower portion of the display sign being positioned in the central bay at a level below the upper edge of the perimeter wall and characterized by the display sign being positioned in the forward portion of the central bay.
2. The apparatus of claim 1 wherein the display sign has opposite display faces with at least one of the display faces including an illuminated changeable display.
3. The apparatus of claim 2 wherein the control assembly comprises a display sign controller mounted on the mobile base and configured to control display of images on the illuminated changeable display, the display sign controller including a wireless transceiver device configured to transmit and receive signals wirelessly from a remote device.
4. The apparatus of claim 2 wherein the display faces of the display sign face laterally with respect to the mobile base, the display sign being rotatable about a substantially vertical axis with respect to the lift assembly such that the display faces face forward and rearward with respect to the mobile base.
5. The apparatus of claim 1 wherein the mobile base includes a tongue assembly mounted on the frame and extending forwardly from the frame, the tongue assembly including a hitch for hitching to a towing vehicle to tow the mobile base over a road surface, a portion of the tongue

assembly being removably mounted on the frame to permit removal of the portion from the frame when towing of the mobile base is not required.

6. The apparatus of claim 1 wherein the partial perimeter wall of the body is mounted on the frame such that the partial perimeter wall remains in a same position as the lift assembly raises and lowers the display sign.

7. The apparatus of claim 1 wherein the lift assembly includes a plurality of tiers, each tier comprising:

a bifurcated beam including a pair of beam portions spaced from each other and being oriented substantially parallel to each other to define a gap; and

a single beam extending through the gap of the bifurcated beam and being mounted on the bifurcated beam at a pivot located medially between upper and lower ends of the single beam and located medially between upper and lower ends of the bifurcated beam.

8. The apparatus of claim 7 wherein the lift assembly includes a lift actuator configured to extend and retract the plurality of tiers of the lift assembly, the lift actuator being at least partially located in the gap defined by the bifurcated beam.

9. The apparatus of claim 8 wherein the lift actuator has a lower end mounted on the frame and an upper end mounted on the single beam of a lowermost one of the plurality of tiers of the lift assembly.

10. The apparatus of claim 1 wherein the power source comprises an electrical power source configured to provide electrical power to the display, the electrical power source comprising an electrical generator.

11. The apparatus of claim 10 wherein the electrical power source comprises an electrical cord with an electrical plug configured to be plugged into an electrical outlet.

12. The apparatus of claim 10 wherein the power source comprises a hydraulic pump configured to pressurize a quantity of hydraulic fluid from a hydraulic tank, the hydraulic pump being in communication with a lift actuator of the lift assembly.

13. The apparatus of claim 12 wherein the control assembly comprises a hydraulic valve configured to control the flow of pressurized hydraulic fluid from the hydraulic pump to the lift actuator.

14. The apparatus of claim 1 wherein the mobile base further comprises a wheel assembly mounted on the frame to support the frame in a manner permitting mobility of the mobile base.

15. The apparatus of claim 1 wherein the partial perimeter wall of the body includes:

a front portion extending substantially transverse to the longitudinal axis at the front of the mobile base;

a pair of side portions continuous with the front portion and extending rearwardly from the front portion on opposite sides of the central bay; and

wherein the perimeter wall has a gap between the side portions and opposite of the front portion at the rear of the mobile base such that the rear portion of the bay is open.

16. A mobile elevating apparatus comprising:

a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, the mobile base comprising a frame;

a lift assembly mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly, the lift assembly including at least one tier;

9

an object mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the object;

a power source positioned on the mobile base; and

a control assembly mounted on the mobile base;

wherein the lift assembly includes a plurality of tiers, each tier comprising:

a bifurcated beam including a pair of beam portions spaced from each other and being oriented substantially parallel to each other to define a gap; and

a single beam extending through the gap of the bifurcated beam and being mounted on the bifurcated beam at a pivot located medially between upper and lower ends of the single beam and located medially between upper and lower ends of the bifurcated beam;

wherein the lift assembly includes a joint joining together in a pivotal manner an upper end of a said beam portion of a relatively lower tier to a lower end of a said beam portion in a relatively higher tier, the joint comprising:

a pair of spaced walls on the lower end of one of the beam portions, each of the spaced walls having an aperture formed in axial alignment with a said aperture in an other one of the spaced walls; and

a sleeve mounted on the upper end of one of the beam portions, the sleeve having a bore;

a pin extending through the apertures of the spaced walls and the bore of the sleeve;

a retainer device configured to retain the pin in position on the spaced walls and the sleeve, the retainer device being configured to resist rotation of the pin with respect to the spaced walls while permitting rotation of the pin with respect to the sleeve.

**17.** The apparatus of claim **16** wherein the retainer device comprises:

a retainer bracket having a retainer aperture formed therein, the retainer aperture receiving an end portion of the pin, a shape of the retainer aperture and a shape of the end portion of the pin being configured to resist rotation of the pin with respect to the retainer bracket when the end portion is inserted into the retainer aperture, the retainer bracket having a tab portion inserted into a hole formed in one of the spaced walls to resist rotation of the retainer bracket with respect to the spaced wall; and

a retainer fastener threaded into a threaded bore on the end portion of the pin, a portion of the retainer fastener extending beyond the end portion of the pin to resist removal of the retainer bracket from the end portion of the pin without removal of the retainer fastener.

**18.** The apparatus of claim **17** wherein the end portion of the pin has at least one flat surface and the retainer aperture of the retainer bracket has at least one flat surface configured to engage the at least one flat surface of the end portion of the pin.

**19.** The apparatus of claim **16** wherein the retainer device comprises:

a retainer bracket having a retainer aperture formed therein, the retainer aperture receiving an end portion of the pin, a shape of the retainer aperture and a shape of the end portion of the pin being configured to resist rotation of the pin with respect to the retainer bracket when the end portion is inserted into the retainer aperture, the retainer bracket having a tab portion

10

inserted into a hole formed in one of the spaced walls to resist rotation of the retainer bracket with respect to the spaced wall; and

a retainer clip removably positioned in a groove formed on the end portion of the pin, the retainer clip being positioned between the retainer bracket and an end of the pin.

**20.** The apparatus of claim **19** wherein the end portion of the pin has at least one flat surface and the retainer aperture of the retainer bracket has at least one flat surface configured to engage the at least one flat surface of the end portion of the pin.

**21.** A mobile elevating apparatus comprising:

a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, the mobile base comprising a frame;

a lift assembly mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly, the lift assembly including at least one tier;

an object mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the object;

a power source positioned on the mobile base; and

a control assembly mounted on the mobile base; and

wherein the mobile base includes a body forming a partial perimeter wall extending upwardly from the frame and extending about a central bay configured to receive at least a portion of the object when the lift assembly is retracted;

wherein the control assembly comprises a display sign controller mounted on the mobile base and configured to control display of images on the illuminated changeable display, the display sign controller including a wireless transceiver device configured to transmit and receive signals wirelessly from a remote device;

wherein the control assembly is configured to prevent operation of the lift assembly if the display sign is receiving electrical power.

**22.** A mobile elevating apparatus comprising:

a mobile base having a front and a rear with a longitudinal axis being defined between the front and rear, the mobile base comprising a frame;

a lift assembly mounted on the frame and being extendable and retractable with respect to the frame to raise and lower a top of the lift assembly, the lift assembly including at least one tier;

an object mounted on the top of the lift assembly such that extension and retraction of the lift assembly raises and lowers the object;

a power source positioned on the mobile base; and

a control assembly mounted on the mobile base; and

wherein the mobile base includes a body forming a partial perimeter wall extending upwardly from the frame and extending about a central bay configured to receive at least a portion of the object when the lift assembly is retracted;

wherein the partial perimeter wall of the body includes: a front portion extending substantially transverse to the longitudinal axis at the front of the mobile base; and a pair of side portions continuous with the front portion and extending rearwardly from the front portion on opposite sides of the central bay;

wherein the partial perimeter wall of the body is open into the central bay at the rear of the mobile base.

\* \* \* \* \*